Neurosurgical Forum

LETTERS TO THE EDITOR

Barriers to global surgery academic collaborations

TO THE EDITOR: We read with keen interest the recent article by Fallah and Bernstein[4] (Fallah PN, Bernstein M: Barriers to participation in global surgery academic collaborations, and possible solutions: a qualitative study. *J Neurosurg* [epub ahead of print April 6, 2018. DOI: 10.3171/2017.10.JNS17435]). We commend the efforts of the authors in carrying out this study, especially for suggesting solutions to the barriers between surgeons in high-income countries and those in low- and middle-income countries as revealed by the study.

In addition to their suggestions addressing some of these barriers, we additionally propose a couple of other ideas, which we believe might be useful for participants in such collaborative programs. First, regarding concerns over the follow-up care that patients would receive after surgical care in low- and medium-income countries, we suggest maximal utilization of various forms of telemedicine available in such settings for follow-up and continuation of patient care,[6,7] such that surgeons coming from high-income countries would not necessarily need to be physically present during the postoperative period to effectively follow up on patients after surgery, thereby significantly shortening the time spent on international collaborative work and, hence, solving not only the problem of loss of income due to long periods away from one's primary job but also the issue of too little time for family and vacation. Second, while we agree with the authors that a similar study such as this should be carried out to examine the peculiarities of difficulties being faced by such collaborations from the perspective of those in both low- and medium-income countries, we would like to point out that results from a recent Africa-based study to assess the interest of neurosurgeons based in low- and medium-income countries in various global surgery initiatives revealed that most neurosurgeons who participated from 21 different African countries not only believed that their training program was inadequate but were also interested in improving it through international collaborations.[5] In fact, findings from that study and those reported in other publications strongly suggest the value of more interest and emphasis on training, compared to other various benefits arising from such international collaborations.[1–3,5] Online education, shared surgical videos, and recent innovations such as telesimulation supplied through remote internet access can be used to teach not only simple but also complex procedural skills to neurosurgeons and trainees based in low- and middle-income countries, and in this way, surgeons coming from high-income countries for such collaborative efforts would not necessarily need to be physically present all the time for such procedures.[5]

Although their suggested solutions to the issues as revealed by the study may not completely address all the concerns (such as the issue of insecurity due to war and terrorism in politically unstable countries, as well as high rates of infectious transmissible diseases prevalent in some low- and middle-income countries), practical steps by the governing health body in high-income countries to make and implement policies that take these proposals into consideration would certainly go a long way in fostering the development, growth, and progress of such collaborations.

Chiazor U. Onyia, FWACS
Lagoon Hospitals, Lagos, Nigeria
Omotayo A. Ojo, FWACS
Lagos University Teaching Hospital, Lagos, Nigeria

References

1. Burton A: Training non-physicians as neurosurgeons in sub-Saharan Africa. **Lancet Neurol 16:**684–685, 2017
2. El-Fiki M: African neurosurgery, the 21st-century challenge. **World Neurosurg 73:**254–258, 2010
3. El Khamlichi A: African neurosurgery: current situation, priorities, and needs. **Neurosurgery 48:**1344–1347, 2001
4. Fallah PN, Bernstein M: Barriers to participation in global surgery academic collaborations, and possible solutions: a qualitative study. **J Neurosurg** [epub ahead of print April 6, 2018. DOI: 10.3171/2017.10.JNS17435]
5. Sader E, Yee P, Hodaie M: Barriers to neurosurgical training in Sub-Saharan Africa: the need for a phased approach to global surgery efforts to improve neurosurgical care. **World Neurosurg 98:**397–402, 2017
6. Synder SR: Editorial. Telemedicine for elective neurosurgical routine follow-up care: a promising patient-centered and cost-effective alternative to in-person clinic visits. **Neurosurg Focus 44(5):**E18, 2018
7. Thakar S, Rajagopal N, Mani S, Shyam S, Aryan S, Rao AS, et al: Comparison of telemedicine with in-person care for follow-up after elective neurosurgery: results of a cost-effectiveness analysis of 1200 patients using patient-perceived utility scores. **Neurosurg Focus 44(5):**E17, 2018

Disclosures

The authors report no conflict of interest.

Correspondence
Chiazor U. Onyia: shalomazor@yahoo.com.

INCLUDE WHEN CITING
Published online August 10, 2018; DOI: 10.3171/2018.5.JNS181337.

Response

We are grateful for the recent letter by Onyia and Ojo regarding our article.

Their suggestion for maximal utilization of telemedicine for follow-up and continued collaboration is an important one. Given the increasingly technological age that we currently live in, it has become possible for partnerships to form and for increasing advances in surgical care to happen at further distances.[1,3,4,5] Increasing the use of telemedicine and technology can potentially reduce the amount of time spent abroad for international collaborative work,[7,8] thus decreasing periods of time spent away from one's primary job and home life. This could address some of the barriers to global surgery work that were pointed out in our study. However, it is still important that we continue to push for the overall field of surgery to accept global surgery as an important academic endeavor, such that rather than these collaborations being an "extra" part of one's career, surgeons could instead dedicate their full academic time to this work, thus relieving strain on their personal lives and encouraging more involvement in the field.[2]

The Africa-based study that Onyia and Ojo pointed out looked at the interest of neurosurgeons in being involved in international collaborations.[6] That study's increased emphasis on training supports the need for partnerships and sustainable global surgery efforts. We agree that in addition to global surgery collaborations, universally available and standardized education in surgery could decrease the amount of time needed to be physically present in lower- and middle-income countries. However, our hope is still that global surgery will be increasingly valued as a career, and this will create the opportunity for physical presence in low-resource settings worldwide, both locally and internationally, to facilitate connections and to foster the development of infrastructure beyond clinical training.

As mentioned by Onyia and Ojo, we suggested solutions for many of the barriers facing surgical healthcare providers who want to be involved in global surgery academic collaborations as a major component of their careers. Although not all barriers can be easily addressed, we ardently hope that academic institutions, professional organizations, and especially our own surgical, obstetric, and anesthesia colleagues will value global surgery as an important endeavor and will implement changes to facilitate careers dedicated to the field.

Parisa N. Fallah, BSA
Harvard Medical School, Boston, MA
Mark Bernstein, MD, MSc, FRCSC
University of Toronto, ON, Canada
Toronto Western Hospital, University Health Network, Toronto, ON, Canada

References

1. Latifi R: Using telemedicine to strengthen medical systems in limited-resource countries. **Bull Am Coll Surg 97:**15–21, 2012
2. Palazuelos D, Dhillon R: Addressing the "global health tax" and "wild cards": practical challenges to building academic careers in global health. **Acad Med 91:**30–35, 2016
3. Rodas EB, Latifi R, Cone S, Broderick TJ, Doarn CR, Merrell RC: Telesurgical presence and consultation for open surgery. **Arch Surg 137:**1360–1363, 2002
4. Rodas EB, Mora F, Tamariz F, Cone SW, Merrell RC: Low-bandwidth telemedicine for pre- and postoperative evaluation in mobile surgical services. **J Telemed Telecare 11:**191–193, 2005
5. Rosser JC Jr, Prosst RL, Rodas EB, Rosser LE, Murayama M, Brem H: Evaluation of the effectiveness of portable low-bandwidth telemedical applications for postoperative followup: initial results. **J Am Coll Surg 191:**196–203, 2000
6. Sader E, Yee P, Hodaie M. Barriers to neurosurgical training in Sub-Saharan Africa: the need for a phased approach to global surgery efforts to improve neurosurgical care. **World Neurosurg 98:**397–402, 2017
7. Synder SR: Telemedicine for elective neurosurgical routine follow-up care: a promising patient-centered and cost-effective alternative to in-person clinic visits. **Neurosurg Focus 44(5):**E18, 2018
8. Thakar S, Rajagopal N, Mani S, Shyam S, Aryan S, Rao AS, et al: Comparison of telemedicine with in-person care for follow-up after elective neurosurgery: results of a cost-effectiveness analysis of 1200 patients using patient-perceived utility scores. **Neurosurg Focus 44(5):**E17, 2018

INCLUDE WHEN CITING
Published online August 10, 2018; DOI: 10.3171/2018.7.JNS181475.

Reoperation for recurrent or persistent ulnar nerve symptoms

TO THE EDITOR: We read with interest the paper by Natroshvili et al.[1] (Natroshvili T, Walbeehm ET, van Alfen N, et al: Results of reoperation for failed ulnar nerve surgery at the elbow: a systematic review and meta-analysis. *J Neurosurg* [epub ahead of print May 11, 2018. DOI: 10.3171/2017.8.JNS17927]). The aim of this paper was to determine overall improvement, residual pain, and sensory and motor deficits following reoperation, regardless of the type of primary surgery performed for this condition.

We value the authors' efforts—foremost the application of appropriate literature search, quality assessment, and data extraction. The resulting meta-analysis included 211 patients from 13 studies. All but one of these studies appeared to be of moderate quality. Analysis showed that 85% of patients had relief of symptoms (decrease in pain, sensory and motor improvement) after reoperation. It was not possible to extract the degree of improvement. A total of 23% of the patients were asymptomatic at the final follow-up.

Unfortunately, in the conclusions and recommendation section no clear perspective was given regarding the effect of pooling patients regardless of the type of primary

surgery, although this is a key factor in the outcome of re-intervention. In our opinion, whatever the clinical question, it makes no sense to pool patients whose primary procedures are as diverse as they are here: in situ decompression (63 of the 293 included surgeries, 22%), subcutaneous transposition (61 of 293, 20%), miscellaneous (91 of 293, 31%), or unknown (78 of 293, 27%). We believe that by doing so, the complexity of the problem of failed ulnar nerve surgery is oversimplified. Moreover, the authors conclude that "it is most likely that the majority of patients will benefit to a greater or lesser extent from surgical re-exploration." They recommend reoperation as a "serious option for patients with this condition." In our opinion the conclusion of this research should have been that the data were too heterogeneous to draw conclusions or make recommendations.

We are more nuanced when counseling our patients on reoperation for recurrent or persistent ulnar nerve symptoms. The optimistic outcome of this systematic review contrasts with our personal experience, which we published in 2017, reporting the clinical outcome of 26 patients who all had undergone the same primary surgery and reoperation. All patients underwent anterior subcutaneous transposition after failed neurolysis of ulnar nerve entrapment.[2] The outcome was rather humbling: pain and/or tingling improved in only 35%, motor function in 23%, and sensory disturbances in 19% of patients. Improvement in at least one of these three clinical modalities was found in 58%. However, a deterioration in one of the three modalities was noted in 46% of the patients. On the patient satisfaction scale, 62% reported a good or excellent outcome. Older age appeared to be a risk factor for a poor outcome. Our recommendation was, and is, that these modest results should be mentioned when counseling patients after failure of neurolysis of ulnar nerve entrapment to manage their expectations, especially in the elderly.

Justus L. Groen, MD, PhD
Willem Pondaag, MD, PhD
Martijn Malessy, MD, PhD
Leiden Nerve Centre, Leiden University Medical Centre, Leiden, The Netherlands

References

1. Natroshvili T, Walbeehm ET, van Alfen N, Bartels RHMA: Results of reoperation for failed ulnar nerve surgery at the elbow: a systematic review and meta-analysis. **J Neurosurg** [epub ahead of print May 11, 2018. DOI: 10.3171/2017.8.JNS17927]
2. van Gent JAN, Datema M, Groen JL, Pondaag W, Eekhof JLA, Malessy MJA: Anterior subcutaneous transposition for persistent ulnar neuropathy after neurolysis. **Neurosurg Focus 42(3):**E8, 2017

Disclosures

The authors report no conflict of interest.

Correspondence

Justus L. Groen: j.l.groen@lumc.nl.

INCLUDE WHEN CITING
Published online January 18, 2019; DOI: 10.3171/2018.11.JNS183116.

Response

We appreciate the response by Groen et al. regarding our article. We agree with the authors that available data were quite heterogeneous, and we were also disappointed that this made it impossible to determine which combination of a primary procedure and reoperation was the most favorable.

Groen et al. point to our process of pooling the overall results regardless of surgery type, and express their concern that this oversimplifies the research question. However, this simplification allowed us to look at the more general question that is very relevant from a patient's perspective: "Can repeated surgery help me if I've been operated on once before for my ulnar nerve entrapment at the elbow without sufficient benefit?" As long as current practice still deals with variation and patients can be offered any of the interventions described in our meta-analysis, it does make sense to ask this overall question. Pooling the data provides a general perspective that suggests that reoperation in these patients does seem to lead to improvement of sorts in the majority of them, regardless of the procedures performed. This makes a surgical re-intervention a serious option to consider and discuss with the patient when a primary procedure has failed. In this respect, we completely agree that a nuanced approach is needed in counseling our patients for recurrent or persistent ulnar nerve compression symptoms at the elbow.

We also strongly agree with Groen et al. that to make any other recommendations, a well-designed, adequately powered, prospective randomized controlled trial with long-term (> 2 years) follow-up will have to be performed.

The authors also comment on the more optimistic outcome of our systematic review that contrasts with their own experience published in 2017. A possible explanation for this discrepancy might be the surgical approach used by van Gent et al.,[3] which was an anterior subcutaneous transposition. The most common type of re-intervention found in our review was an anterior submuscular transposition. Considering the results of Bartels et al.,[2] who clearly showed in a randomized controlled trial that anterior subcutaneous transposition is inferior to simple decompression, but also the results of Bartels and Grotenhuis[1] and Wever et al.,[4] and even the studies that van Gent et al.[3] refer to in their paper, we believe that the results of our meta-analysis once more support the notion that a subcutaneous approach is inferior to an anterior submuscular transposition.

Tinatin Natroshvili, MD
Erik T. Walbeehm, MD, PhD
Nens van Alfen, MD, PhD
Ronald H. M. A. Bartels, MD, PhD
Radboud University Medical Center, Nijmegen, The Netherlands

References

1. Bartels RH, Grotenhuis JA: Anterior submuscular transposition of the ulnar nerve. For post-operative focal neuropathy at the elbow. **J Bone Joint Surg Br 86:**998–1001, 2004
2. Bartels RH, Termeer EH, van der Wilt GJ, van Rossum LG, Meulstee J, Verhagen WI, et al: Simple decompression or anterior subcutaneous transposition for ulnar neuropathy at the

elbow: a cost-minimization analysis–Part 2. **Neurosurgery 56:**531–536, 2005
3. van Gent JAN, Datema M, Groen JL, Pondaag W, Eekhof JLA, Malessy MJA: Anterior subcutaneous transposition for persistent ulnar neuropathy after neurolysis. **Neurosurg Focus 42(3):**E8, 2017
4. Wever N, de Ruiter GCW, Coert JH: Submuscular transposition with musculofascial lengthening for persistent or recurrent cubital tunnel syndrome in 34 patients. **J Hand Surg Eur 43:**310–315, 2018

INCLUDE WHEN CITING
Published online January 18, 2019; DOI: 10.3171/2018.11.JNS183225.

From a polemic paradox to a proper perspective of job burnout and job satisfaction

TO THE EDITOR: We read with interest Laurent and colleagues' Letter to the Editor[4] (Laurent E, Schonfeld IS, Bianchi R: "Burned out" at work but satisfied with one's job: anatomy of a false paradox. *J Neurosurg 129:*1371–1373, November 2018) regarding the article by Attenello et al.[1] (Attenello FJ, Buchanan IA, Wen T, et al: Factors associated with burnout among US neurosurgery residents: a nationwide survey. *J Neurosurg 129:*1349–1363, November 2018) in which high prevalence in burnout and job satisfaction were simultaneously reported. Laurent et al. claim a false paradox and state that this "apparent paradox attached to Attenello and colleagues' findings is accounted for by persistently ignored problems in burnout's conceptualization and measurement."

We agree with Laurent et al. regarding the perennial problems in burnout research, particularly with the use of arbitrary cutoff points for clinical diagnostic purposes, which creates unrealistic and inadequate conclusions. However, 2 points should be reconsidered with respect to their "false paradox":

First, part of the conceptual and empirical problem of burnout is that many researchers force it into a biomedical disease model despite its being a psychosocial one, where the role of social-individual interaction in well-being and disease prevention is essential. Theoretically, alterations in psychological well-being are different from a more stable mental disease.[3] Burnout has been unanimously recognized as a consequence of stress and a pathogenic mediator between job exposures and mental disease in virtually all conceptual and theoretical models.[9] Thus, a measure of burnout should not have "clinical underpinning," "clinical validity," or be used to "diagnose a case," as the authors expect and medical epidemiologists do in the actual research. It should rather be used to capture the variability of exhaustion and cynicism resulting from work, as a secondary prevention screening effort. Furthermore, it seems that Laurent et al.[4] are confusing phenomenon and construct. The Maslach Burnout Inventory (MBI) is not "burnout." Alternative instruments with better performance have been widely used in Spanish.[2] The unquestionable problems of burnout measures or their misuse are different from the construct itself, as when "the sword is confounded with the hand" in psychometric research.[7]

Second, all critiques by Laurent et al. were focused entirely on burnout. However, job satisfaction research is plagued with definitional and methodological issues,[8] and methodological vulnerabilities in job satisfaction measurement are present in Attenello and colleagues' study. These methodological vulnerabilities include social desirability bias, acquiescence or other idiosyncratic answer patterns, use of arbitrary cutoff points, self-selection bias, and the use of a single item, which causes loss of information and problems with reliability and content validity (given the multidimensionality of the construct)—all of which call into question the high prevalence of satisfaction reported in the study. Furthermore, if valid, job satisfaction commonly shows very high prevalence in different nations,[10] even in jobs with high precariousness in developing countries.[6] This contradiction has been explained by the aspirational paradox,[5] in which people overstate minor positive aspects of their work due to the limited prospects in the current global market. Such an idea is consistent with the objective working conditions reported by neurosurgeons in Attenello and colleagues' study. Thus, job satisfaction could be also a sort of adaptation effort under adverse working conditions, a coping strategy to attenuate work that has high demands and low rewards, or an optimistic view in the midst of difficulties but, nonetheless, not the exact opposite of burnout.

Arturo Juárez García, PhD
Centro de Investigación Transdisciplinar en Psicología, Universidad Autónoma del Estado de Morelos, Cuernavaca, Morelos, México

Pedro R. Gil-Monte, PhD
Unidad de Investigación Psicosocial de la Conducta Organizacional (UNIPSICO), Universidad de Valencia, Valencia, Spain

César Merino-Soto, MP
Instituto de Investigación, Escuela de Psicología, Universidad de San Martín de Porres, Lima, Perú

Javier García Rivas, MA
Center for Occupational and Environmental Health, University of California, Irvine, CA

References

1. Attenello FJ, Buchanan IA, Wen T, Donoho DA, McCartney S, Cen SY, et al: Factors associated with burnout among US neurosurgery residents: a nationwide survey. **J Neurosurg 129:**1349–1363, 2018
2. Gil-Monte PR, Olivares, VF: Psychometric properties of the "Spanish Burnout Inventory" in Chilean professionals working to physical disabled people. **Span J Psychol 14:**441–451, 2011
3. Kinderman P: Get the message right: a psychosocial model of mental health and well-being, in Kinderman P (ed): **A Prescription for Psychiatry.** London: Palgrave Macmillan, 2014, pp 30–47
4. Laurent E, Schonfeld IS, Bianchi R: "Burned out" at work but satisfied with one's job: anatomy of a false paradox. **J Neurosurg 129:**1371–1373, 2018 (Letter)
5. Lora E: **Beyond Facts. Understanding Quality of Life.** Washington, DC: Inter-American Development Bank, 2008, pp 4, 25–26 (https://publications.iadb.org/bitstream/handle/11319/7200/Beyond_Facts._Understanding_Quality_

of_Life.pdf?sequence=2&isAllowed=y) [Accessed December 18, 2018]
6. Lora E, Graham CL: The conflictive relationship between satisfaction and income, in Graham CL, Lora E (eds): **Paradox and Perception: Measuring Quality of Life in Latin America.** Washington, DC: Brookings Institution Press, 2010, pp 57–95
7. Merino C, Domínguez S: [Differentiating the sword of the hand.] **Rev Latinoam Cienc Soc Ninez Juv 15:**629–631, 2017 (Span)
8. Ravari A, Mirzaei T, Kazemi, M, Jamalizadeh A: Job satisfaction as a multidimensional concept: a systematic review study. **J Occup Health Epidemiol 1:**95–102, 2012
9. Richardsen AM, Ronald JB: Models of burnout: implications for interventions. **Int J Stress Manag 2:**31–43, 1995
10. Sousa PA, Sousa PA: Well-being at work: a cross-national analysis of the levels and determinants of job satisfaction. **J Socio Econ 29:**517–538, 2000

Disclosures

The authors report no conflict of interest.

Correspondence

Arturo Juárez García: arturojuarezg@hotmail.com.

INCLUDE WHEN CITING
Published online January 25, 2019; DOI: 10.3171/2018.10.JNS183014.

Response

Juárez García and colleagues commented on a Letter to the Editor in which we discussed the limitations of the interpretations of a study on burnout among US neurosurgery residents. In our analysis of Attenello and colleagues' article, we stressed that 1) using arbitrary cutoff scores to identify "burned out" individuals can lead to the inclusion of large numbers of individuals who only experience normal mood fluctuations and 2) "many individuals reporting burnout symptoms may simultaneously be satisfied with their job for the basic reason that their symptoms are not caused by work-related difficulties."

In their correspondence regarding our comments, Juárez García and colleagues made 3 points.

First, they recognized that "the use of arbitrary cutoff points for clinical diagnostic purposes … creates unrealistic and inadequate conclusions."

Second, the authors considered that "part of the conceptual and empirical problem of burnout is that many researchers force it into a biomedical disease model despite its being a psychosocial one." Problematically, these authors' scholastic argument a priori excludes biological or bodily factors from psychological conceptualizations. Scientists usually face considerable difficulties when trying to describe complex processes. If the understanding of biological processes sheds light on the complex processes that bear on burnout, then there is no reason to exclude research on those processes. We have long lamented the tendency of burnout researchers to endorse restrictive, socially biased views of burnout without regard for biology and history of disorders. Juárez García and colleagues' line of reasoning reflects such a tendency. Instead of rejecting the findings of biological research, we should develop a complexity-oriented approach to burnout and other depressive conditions that integrates various levels of observation (e.g., biological, psychological, and social).[3] There is a need to recognize that cognitive or "affective" processes in burnout are both socially situated *and* biologically embodied—it clearly makes no sense to consider that some subjective processes, such as exhaustion or depersonalization, are merely "psychosocial" by fiat without considering other individual factors.[1]

Third, the authors complained about the potential weakness of Attenello and colleagues' single-item measure of job satisfaction, which could explain why participants categorized as "burned out" could have reported being satisfied with their work. Though we did not deal with these questions in our previous correspondence, we note that the use of single items has been found to be largely acceptable in various research areas, such as the research areas pertaining to job satisfaction,[4] quality of life,[5] and mortality risk:[2] "The use of single-item measures should not be considered fatal flaws in the review process."[4] Moreover, investigators who draw opposite conclusions (by stating, for instance, that participants would overstate minor positive aspects of work) to what self-reports straightforwardly point out (i.e., job satisfaction) should be prepared to defend such a view with supportive evidence, not with unsupported claims.

Eric Laurent, PhD
Laboratory of Psychology (EA 3188),
Bourgogne Franche-Comté University, Besançon, France

Irvin S. Schonfeld, PhD, MPH
The City College of the City University of New York, New York, NY

Renzo Bianchi, PhD
Institute of Work and Organizational Psychology,
University of Neuchâtel, Neuchâtel, Switzerland

References

1. Bianchi R, Schonfeld IS, Laurent E: Burnout or depression: both individual and social issue. **Lancet 390:**230, 2017
2. Idler E, Benyamini Y: Self-rated health and mortality: a review of twenty-seven community studies. **J Health Soc Behav 38:**21–37, 1997
3. Laurent É, Bianchi R, Schonfeld IS, Vandel P: Editorial: depression, burnout, and other mood disorders: interdisciplinary approaches. **Front Psychol 8:**282, 2017
4. Wanous JP, Reichers AE, Hudy MJ: Overall job satisfaction: how good are single-item measures? **J Appl Psychol 82:**247–252, 1997
5. Yohannes AM, Dodd M, Morris J, Webb K: Reliability and validity of a single item measure of quality of life scale for adult patients with cystic fibrosis. **Health Qual Life Outcomes 9:**105, 2011

INCLUDE WHEN CITING
Published online January 25, 2019; DOI: 10.3171/2018.11.JNS183030.

The career of an academic neurosurgeon: back to the future

TO THE EDITOR: We read with extreme interest the

article by Dr. Dacey[2] on the developmental stages of an academic neurosurgeon (Dacey RG Jr: Developmental stages in the career of an academic neurosurgeon. *J Neurosurg 129:*1364–1369, November 2018). The author has managed to capture the essence of academic neurosurgery by describing the trials and tribulations of a long career. He has divided neurosurgery into clinical, research, and leadership domains and further subdivided them as per the growth of a neurosurgery career. There are many in the neurosurgical community who will identify with the stages that Dr. Dacey has described. However, we believe there are significant exceptions to the progression that has been described, and we would like to touch upon these to complete the picture that Dr. Dacey has painted.

The first point of exception originates from the myriad of academic institutions that exist in large countries like India and China and institutions that are newly established in less-privileged countries. While the author's descriptions fit well in the context of larger institutions with many tiers of academic and professional levels, there are many neurosurgeons who start out in less-established centers. They are actively involved in both clinical practice and research as well as leadership in furthering the growth of their establishment. We believe that the career course of these neurosurgeons may follow the trends of neurosurgeons in the past generations more closely than those in the new. It cannot be correct to assume that the stages that were experienced by our founding fathers (Harvey Cushing, Walter Dandy, Victor Horsley) will be the same as recent leaders with international legacies (Thor Sundt, John Jane, Robert Spetzler), nor will they be in any way the same to the current budding generation (Millennial neurosurgeons).

While our founding fathers had the uphill task of establishing neurosurgical centers and procedures from ground zero, many of the current legends were responsible for pushing the boundaries of neurosurgery to where they are today. When in 1886, Victor Horsley (1857–1916) was appointed surgeon to the National Hospital for the Paralysed and Epileptic at Queen Square, London, it was the first-ever neurosurgical appointment anywhere in the world, and though in 1 year he performed 10 cranial operations, he had no beds under his command and used to operate only when invited to do so.[4] In 1896, Harvey Cushing became an assistant resident under William Stewart Halstead, the much-celebrated surgeon famed for devising the time-tested operation for carcinoma of the breast at Johns Hopkins Hospital, and worked for 4 years under his supervision. Cushing subsequently worked out an arrangement with Halstead whereby he handled the neurological cases involving patients admitted to the wards.[1] Surely, the stages of his academic neurosurgery were different from the current generation. It is also wrong to draw conclusions saying that such stages do not exist today, as new centers keep opening in various locations all over the world, and although the hardships faced may not be the same as before, any neurosurgeon joining or establishing a new center has a different experience from those who join a well-established facility.

Again, while the current world leaders are in no way less than our founders, they have had a different perspective on neurosurgery. Much of what Dr. Dacey describes in his paper[2] pertains to this generation. Research begins with a K-level career development award from the National Institutes of Health or, if one hails from the sub-continent, an extra- or intramural grant for a research project as a principal investigator, and the individual gradually goes up the ladder to achieve significant contributions in the form of a surgeon-scientist. Clinically, the current world leaders have devoted a significant part of their career to a particular ailment, resulting in breakthrough discoveries. The author mentions Dr. Robert Spetzler, who was recruited by Dr. John R. Green to assume the J. N. Harber Chair of Neurological Surgery at Barrow Neurological Institute in Phoenix, Arizona. Under his able leadership, Barrow grew from primarily a regional center to an internationally recognized center of excellence that attracts both visiting healthcare professionals and patient referrals from around the world. This was possible because of Dr. Spetzler's dedication and availability of the technology required to carry out research that ultimately led to the development of theories on normal perfusion pressure breakthrough and how the size of arteriovenous malformations (AVMs) is related to their rupture; the development of a grading system for AVMs; the Barrow Ruptured Aneurysm Trial (BRAT); and hypothermia and cardiac arrest–based treatments that were not possible during the previous era.

The second point of departure from the described stages is with the context of the Millennial generation and the impact of information technology. While the clinical practice and surgical prowess of a neurosurgeon may still follow classic patterns and grow linearly with time, the research and leadership spheres may follow non-linear patterns of growth and produce significant exceptions in neurosurgical careers. For the Millennial generation of neurosurgeons, the definitions of success in research and leadership are very different.[3] To the neurosurgeon of the "social media generation," the meaning of an established researcher varies from increased impact factors to online visibility to invitations from international societies. Measures of leadership have also transformed from institutional representation in conferences to global online recognition as founders of neurosurgical groups on platforms like Facebook and creators of online video channels on YouTube, Zoom, etc.

The current generation (Generation Y or Millennials) has been the subject of much scrutiny. They are decidedly different from the previous generation, with their extreme affinity for technology, their need for instant success or need to make an "impact" and being more tolerant on social issues, and their emphasis on close family ties, team orientation, social responsibility, and having fun at work.[6] They are expected to switch jobs faster (due to increased dissatisfaction), which will affect all the stages of their career, as going into any new environment causes a delay in establishing oneself and integrating into the work environment. They are also more likely to have a better social structure with fewer workplace quarrels, and they want to have more fun during work. This will also spill over to their patient care, with a more personal touch and less of "doctoring" compared to previous generations. Technological affinity will lead to more breakthroughs related to

machine learning and instrument-heavy research rather than just clinical paradigms. It would have been useful to mention in this paper certain aspects to prepare this coming generation of leaders. Patience and need to acknowledge the groundwork laid by previous generations along with our increased tolerance and acceptance for them will be among the traits needed for the current academic neurosurgeon.

Our speciality is unlike most other surgical fields and unlike most professions, for that matter. Traditionally, neurosurgery can only be compared to cardiothoracic surgery in recruiting the best and brightest. Since these exceptional individuals recognize their potential, delay in success leads to rapid dissatisfaction. Rather than service-predominant training, we should focus on a balance of operative and clinical work, especially with an 80-hour work week. This stage of training profoundly impacts the perception of our speciality among potential trainees, and unless these issues are addressed now, they may lead us to a future that cardiothoracic surgery is now facing.[5]

The stages described by Dr. Dacey are commendable and relatable. They provide a roadmap for young neurosurgeons. But just like variations in anatomy, we believe that exceptions help complete the picture of neurosurgical development. With newer institutions led by the younger generation and research and leadership in the Millennial era, we believe there are many who are deviating from and even "jumping" predefined career paths and stages.

Harsh Deora, MCh, DNB
Sanjay Gandhi Post Graduate Institute of Medical Education and Research, Lucknow, India

Nishant S. Yagnick, MCh
Paras Hospitals, Gurgaon, India

Manjul Tripathi, MCh
Postgraduate Institute of Medical Education and Research, Chandigarh, India

References

1. Bhattacharyya KB: **Eminent Neuroscientists: Their Lives and Works.** Kolkata: Academic Publishers, 2011
2. Dacey RG Jr: Developmental stages in the career of an academic neurosurgeon. **J Neurosurg 129:**1364–1369, 2018
3. Deora H, Tripathi M, Yagnick NS, Deora SP, Mohindra S, Batish A: Changing hands: why being ambidextrous is a trait that needs to be acquired and nurtured in neurosurgery. **World Neurosurg** [epub ahead of print], 2018
4. Haas LF: Harvey Williams Cushing (1869–1939). **J Neurol Neurosurg Psychiatry 73:**596, 2002
5. Salazar JD, Lee R, Wheatley GH III, Doty JR: Are there enough jobs in cardiothoracic surgery? The Thoracic Surgery Residents Association job placement survey for finishing residents. **Ann Thorac Surg 78:**1523–1527, 2004
6. Spiotta AM, Kalhorn S, Patel S: Millenials in neurosurgery: is there hope? **Neurosurgery 83:**E71–E73, 2018

Disclosures

The authors report no conflict of interest.

Correspondence

Manjul Tripathi: drmanjultripathi@gmail.com.

INCLUDE WHEN CITING
Published online February 15, 2019; DOI: 10.3171/2018.11.JNS183259.

Response

I read with interest the letter from Drs. Deora, Yagnick, and Tripathi with regard to my article. Certainly they are correct in stating that my perception of these developmental stages is most relevant to academic institutions in the United States. It is also likely that the evolution of neurosurgical careers may be different in future generations of neurosurgeons, especially in the context of different generational values and the evolving technology of digital and social media.

My paper is a very personal set of opinions based on about 40 years of observations. I hope that it will be useful to younger neurosurgeons who are planning and conducting their careers in our great specialty.

Ralph G. Dacey Jr., MD
Washington University School of Medicine, St. Louis, MO

INCLUDE WHEN CITING
Published online February 15, 2019; DOI: 10.3171/2018.12.JNS183292.